



ELEMENTARY SCHOOLS MATHEMATICS AND SCIENCE TEACHERS' PERSPECTIVES ON USING ENGLISH AS A MEDIUM OF INSTRUCTION

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Abstract

Purpose of the study: The purpose of the study is to investigate Mathematics and Science elementary school teachers' perceptions of using English as a medium of instruction in the United Arab Emirates (UAE) primary schools.

Methodology: This research utilized an explanatory sequential mixed-methods design. The first phase of the research featured self-reporting by means of a questionnaire for elementary teachers (n=117), and the second phase used qualitative data by means of focus-group interviews (n=15).

Main Findings: The results revealed that there is consensus among Mathematics and Science teachers that students' performance and achievements will benefit from the students' native language (Arabic) when used. Additionally, the teachers expressed that the students' low English proficiency embedded their understanding of Mathematics and Science concepts. Moreover, teachers indicated that they spend considerable class time teaching English instead of Mathematics and Science concepts.

Applications of this study: This study is intended to portray teachers' perspectives on using English as a medium of instruction in the UAE elementary schools. It is hoped that the findings of the study may have implications for teachers, curriculum designers, and policymakers.

Novelty/Originality of this study: In the context of the UAE, studies involving the investigation of using English as a medium of instruction were focused mainly on higher education. Thus, this study has the potential to fill an important gap by extending the research to include teachers and students in elementary school and beyond.

Keywords: *Medium of Instruction, Mathematics Teachers, Science Teachers, Elementary Schools, UAE.*

INTRODUCTION

The English language has recently gained more importance as a result of advancements in different fields such as Mathematics, Science, and I.T. These advances have partially contributed to countries introducing English as the medium of instruction through which Mathematics and Science can be taught, including the United Arab Emirates (UAE). In recent years, Education in the UAE has undergone constant changes. Most notably, in 2009, the Abu Dhabi Education Council, the governing body supervising schools in the emirate of Abu Dhabi, implemented new policy by using English as the language of instruction in schools for teaching Mathematics and Science (Khalaf, 2009). However, researchers and educators have expressed some concerns about the impact of this decision on students' learning outcomes (Al-Issa, 2017; Barnard, 2014; Belhiah & Elhami 2015; Kagwesage, 2012; Troudi, 2009; Troudi & Jendli, 2011; Solloway, 2016).

Most of the teachers in the UAE are expatriates from different countries where English is spoken as a first or second language. Their English differs from the English learned by Emirati students. That is, the students' level of language skills has affected their mathematical and Science development. The practice of teaching English through the contents of Mathematics and Science and vice-versa to children is supported by their teachers (Rogier, 2012). Hence, the purpose of this study is to explore the perspectives of Mathematics and Science teachers on using English as a medium of instruction to teach Mathematics and Science in the UAE elementary schools (students aged from 6-10) using a mixed-methods approach. Specifically, this study aims to provide in-depth information about teachers' perspectives on the use of English as the medium of instruction and the obstacles they face using English to teach these two important subjects. In addition, the study aims to explore the preferred instructional methods in teaching Mathematics and Science.

The significance of the study stems from that the fact that there is very little research focused on Mathematics and Science teachers' perceptions of the impact of English as the medium of instruction in elementary schools in the UAE. It is believed that this study will add to the previous research investigating this rapidly growing global phenomenon. The current study seeks answers to the following research questions:

1. What are Mathematics and Science teachers' perceptions toward the use of English as the medium of instruction in their teaching?
2. What are the obstacles encountered by Mathematics and Science teachers when using English as the medium of instruction?
3. How, if at all, do experience and novice Mathematics and Science teachers differ in their teaching practices?

4. What are the most instructional practices Mathematics and Science teachers prefer when using English as the medium of instruction?

LITERATURE REVIEW

Since English is considered a global language as well as a means to modernization, many scholars argued that there is a valid rationale for using English-Medium Instruction (EMI) in Education ([Asiri, 2019](#); [Rogier, 2012](#); [Siemund et al., 2020](#)). [Dearden \(2014: 2\)](#) defined EMI as “The use of the English language to teach academic subjects in countries or jurisdictions where the first language (L1) of the majority of the population is not English”. Consequently, the UAE among many other countries believes that adopting English as a medium of instructions in their schools is a practical policy which may serve as a mechanism for internationalization, modernization and to compete in global academic. Furthermore, many argue that EMI is a way to enhance students’ English language capabilities, to ensure their readiness to compete in a world market, and to provide an international learning experience in countries where English is not the primary language ([Rose and McKinley 2018](#)).

Exploring the role of the language used in classrooms is a focus of investigation around the world because it plays a prominent role in the success or the failure of educational systems ([Alieto, 2018](#); [Beka, 2016](#); [Macaro, 2019](#); [Perez & Alieto, 2018](#)). As a result, the use of English as the medium of instruction in classrooms has been a focus of investigation in Europe, Africa, Asia, and South America. As it relates to specific subjects such as Mathematics and Science, a good number of studies have been conducted by a number of researchers around the world to investigate the use of English as the medium of instruction. Specifically, researchers have explored the benefits and obstacles in adopting English as a medium of instruction. The findings of such studies demonstrate mixed views by the public and academics as well as varied (positive and negative) educational outcomes ([Mouhanna, 2016](#)). For example, [King’s \(2014: 2-3\)](#) study reported EMI received great support despite the fact that students’ insufficient language ability was evident. As a result, both students and teachers started using some strategies to handle the language challenges through simplifying materials, code-switching into Arabic, avoiding difficult structures, and reducing content. In a similar vein, the findings of [Rogier’s \(2012: 122-126\)](#) study showed that participants using EMI for four years resulted in improving their four English-language skill areas, as evidenced by the IELTS exam. The most developed skill was speaking, followed by reading, writing, and then listening. However, teachers felt that their students’ language ability did not live up to their expectations, and consequently, modifications to course content and assessment criteria are needed ([Rogier, Ibid.](#)). It has been suggested that clear instructional goals to develop students’ language skills along with a solid support system for teachers and learners throughout their educational experience are needed ([Rogier, Ibid.](#)).

In a Malaysian study, for example, [Ong & May \(2008\)](#) reported that while interviewed teachers were in support of using English as a medium of instruction to teach Mathematics and Science, the majority of them were still struggling with the reality of fully adopting the policy. They reported three primary factors limiting teachers’ effectiveness to teach entirely in English: teachers’ educational background, students’ language abilities, and schools’ linguistic environment. Another study conducted in Malaysia ([Ahmad, Jaaman, Majid, & Rambely, 2013](#)) about the challenges in teaching and learning Mathematics in the transition to English medium found that student achievements were much higher when Malay was the medium of instruction rather than English. They also found that students believed that teaching and learning Mathematics could be more effective if conducted in Malay instead of English because of their limited proficiency level of English. In a similar vein, [Haryanto \(2012\)](#) investigated the implementation of English as the medium of instruction in an international standard school in Indonesia. It was found that students preferred to use Bahasa Indonesia as a medium of instruction in Mathematics and the sciences instead of English ([Haryanto, Ibid.](#)). Similarly, within the context of Nepal, [Khatri \(2019\)](#) reported that teachers have been facing numerous challenges in implementing EMI in their classrooms, like students’ language ability and the interference of students’ mother tongue.

Several researchers investigated the use of English as the medium of instruction in African countries ([Brock-Utne, 2010](#); [Clegg & Simpson, 2016](#); [Early & Norton, 2014](#); [Kuchah, 2016](#); [Kyeyune, 2003](#); [Milligan et al., 2016](#); [Owu-Ewic & Eshun, 2015](#); [Pearson, 2014](#); [Probyn, 2006](#); [Trudell, 2016](#)). For example, the results from a study by [Kyeyune \(2003\)](#) explored the challenges of using English as the medium of instruction in Uganda showed that the use of English as the medium of instruction hinders learners’ actions in the classroom and limits their interactions.

However, in the context of the UAE, studies involving the investigation of using English as a medium of instruction were focused mainly on higher Education ([Belhiah & Elhami, 2015](#); [Mouhanna, 2016](#); [Rogier, 2012](#); [Troudi & Jendli, 2011](#); [Solloway, 2016](#)). [Belhiah & Elhami \(2015\)](#), for example, examined the effectiveness of English as a medium of instruction in six universities located in major cities throughout the UAE. Specifically, a total of 500 students and 100 teachers participated in the study by completing survey questionnaires and structured interviews. The results indicated that students are struggling to learn the subject matter due to their low proficiency in English. Additionally, results revealed that almost two-thirds (62%) of students preferred bilingual model of instruction, while only 27% favored English as a medium of instruction. Similarly, the majority of the teachers (75%) were in favor of the bilingual model whereas only 19% expressed a preference for the use of English as a medium of instruction. As a result, the paper suggested implementing a bilingual curriculum in which instruction is delivered in English and Arabic ([Belhiah & Elhami, 2015](#)).

In a similar study, [Wanphet & Tantawi \(2018\)](#) used a mixed-methods approach to explore the perceptions of university students and instructors regarding English as the medium of instruction for teaching Science courses in the UAE. The findings of this study indicated that students and instructors were concerned with the effectiveness of the use of English as a medium of instruction regarding its effects on students' progress and academic skills.

[Mouhanna \(2016\)](#) examined teachers' perceptions of English as a medium of instruction (EMI) in a higher education institute in the UAE. The author used in-depth semi-structured interviews with nine teachers from different faculties. Interviewed teachers believe that the use of English as a medium of instruction may function as a barricade to students' comprehension, quality of work, and academic performance. Additionally, teachers reported that the use of English as a medium of instruction had negative effects on their pedagogical practices. Specifically, they felt that they have been forced to modify the depth and the scope of courses as well as their pace.

As previously stated, most research on the impact of English as a medium of instruction in the UAE has been performed at the higher education level to investigate students' learning experience and the perceptions of university students and lecturers. Thus, this study has the potential to fill an important gap by extending the research to include teachers and students in elementary school and beyond. This is due to the significance of this age in learning these important subjects, namely Mathematics and Sciences, the problem is sorted at an early age. To do so, ($n=117$) elementary Mathematics and Science teachers were selected to respond to the study questions, which will be elaborated in the following methodology section.

METHODOLOGY

Research Design

The study utilized an explanatory sequential mixed-methods design. In other words, the study employed a combination of quantitative and qualitative instruments for data collection. The explanatory sequential mixed-methods is found to serve the purposes of the study in a better way as it helps in the triangulation of the data ([Clark, 2019](#); [Creswell & Creswell, 2017](#); [Ismail & Jarrah, 2019](#)). It provided the opportunity to examine the research problem from different angles and to capture a larger picture of the phenomenon ([Ismail & Al Allaq, 2019](#)). The quantitative instrument included a questionnaire and the qualitative one included a focus-group interview. The researcher used focus-group interviews to allow participants to expand on their quantitative responses and to provide further in-depth contemplation of the obstacles they may face when using English as the medium of instruction for teaching Mathematics and Science in elementary school classes.

Participants and Sampling

In line with the purpose and design of the study, a convenience sampling was used for collecting quantitative data by using a questionnaire from volunteered participants who were available during the time of distributing the questionnaires in elementary schools. [Mills and Gay \(2019\)](#) referred to convenience sampling as a haphazard or accidental sampling, which may include anybody who happens to be available during the data collection time. The main intention of the study was not to focus on any particular group of teachers with pre-stated characteristics since the present study is exploratory in nature. The participants of this study were 117 teachers who teach Mathematics and Science in elementary school classes in one of the major towns in the Emirate of Abu Dhabi, UAE. The questionnaires were distributed and collected from all teachers. Only 19 male teachers participated in the study, and the rest of them were female (98). The big difference between the proportion of male and female teachers is due to the current policy, which gives priority for female teachers to teach at the elementary school level. All those teachers represent diverse cultural, social, and educational backgrounds. Most of them are expatriate teachers from New Zealand, the U.K., United States, Canada, South Africa, and Australia, while a few of them are young Emirati teachers. Those different groups of teachers represent diverse educational systems and teaching and learning practices. Their recruitment to teaching Mathematics and Science in elementary schools was based on their native language (English), which is the medium of instruction for both subjects at the elementary level. Those teachers are also expected to help the students learn English as a second language (ESL), but many of them do not have experience in teaching ESL. Thus, the styles and approaches of teachers in teaching ESL or teaching Mathematics and Science through English will vary depending on their language and educational backgrounds and total teaching experience. In relation to their years of teaching experience, 77 of them have more than five years of teaching experience, while the rest of them (40) have five years of experience or less. The less experienced the teachers are, the more professional developments are needed. For instance, [Yadav \(2011\)](#) noted that a professional development program is very important to enhance and enrich both English language learning and students to develop themselves as ELT professionals. The same conclusion was reached by [Komba and Nkumbi \(2008\)](#), who believed that teachers perceived professional development activities as an integral element of improving teachers academically, professionally, and technically.

The focus-group interviews included only 15 female and male teachers from three different elementary schools. The researcher used purposive sampling to select the focus-group interview participants from the total number of teachers and schools from which the questionnaire data were obtained. The three chosen schools met the criteria set by the researcher for the selections of different teachers for the focus group interviews. The first criterion was that there were



male and female teachers in each of the three schools. The second criterion was that there were five or more teachers in each school. The other criteria were relevant to practicality, diversity of teachers, and partnership with these schools.

Instruments

The researcher developed and constructed two research instruments for the purpose of collecting the data, namely a questionnaire and a focus group interview. The questionnaire was developed by the researcher to collect the required data to answer the research questions. Specifically, teachers were asked to assess the degree to which they agree or disagree with the statements relevant to the use of English as a medium of instruction in teaching Mathematics and Science. The researcher drafted the items of the questionnaire based on the purpose, research questions, and design of the study.

The questionnaire included three main sections, each of which represents a single theme relevant to the use of English as a medium of instruction. The first theme is relevant to Mathematics and Science teachers' views regarding the use of the English language as the medium of instruction for teaching Mathematics and Science in elementary school classes. The second theme focuses on the difficulties of using English as the language of instruction to teach Mathematics and Science, while the last one deals with the instructional methods used in teaching Mathematics and Science to elementary school students. These three themes were carefully aligned with the research questions and/or the specific design of the study.

The development of the questionnaire had undergone several stages before it was finalized and used for the collection of the quantitative data. Based on the researcher's review of the relevant questionnaire literature and their previous knowledge and experience in this area, a set of questions for each of the three themes were drafted. The researcher reviewed the questionnaire's items to check each item's relevance, clarity, and language. Then all the approved items for the three sections were combined and organized according to the major themes of the questionnaire. After that, a group of six university-experienced instructors were requested to evaluate the questionnaire in order to establish its validity. They were specifically instructed to look at each item in relation to the clarity of its meaning, clarity of language, its relevance to the purpose of the study, and its importance, etc. The researcher collected all the written responses from all members of the evaluation group and then met each member individually for further clarifications and discussions of their responses.

All the evaluators' comments/suggestions were taken into consideration and incorporated to improve the quality and readability of the instrument. After reviewing the questionnaire based on the evaluators' comments, it was piloted with 30 teachers who were later excluded from participating in the main study. Thus, both the evaluation and piloting of the questionnaire helped in improving its quality and establishing its validity.

For the purpose of establishing the reliability of the questionnaire, the Cronbach Alpha Formula was used to compute the reliability value of each of the three themes and the overall value. The overall internal consistency for the three themes or sections found to be 0.89. This calculated high value of the Cronbach Alpha asserted a high level of internal consistency (reliability) between the three main themes of the questionnaire (see Table 1).

Table 1: Reliability Coefficients of the Questionnaire

Variable	Cronbach's Alpha	Items No	Number
1. Teachers' views of using English	0.88	16	117
2. Difficulties using English	0.85	13	117
3. Teaching strategies	0.86	16	117
Overall	0.89	49	117

Similarly, the questions of the focus group interview were developed in about the same way as the questionnaire's questions. The researcher first drafted two questions to seek more clarifications and collect more data for each of the three themes of the questionnaire. Then, a total of six questions were given to the same six evaluators who looked at the questionnaire. They were asked to check if the questions would help in generating more information relevant to each of the three themes. In the end, the questions were reviewed and finalized based on the evaluators' comments and/or suggestions. The main purpose of the focus group interviews was to collect more relevant data from the fifteen interviewees to support the quantitative data collected by the questionnaire. The interview questions were of great value as they offered the participants further opportunities to elaborate on their views and concerns regarding the issue of using English as a medium of instruction to teach Mathematics and Science.

Data Collection

During the second semester of the academic year 2017–2018, the researcher and two research assistants from the College of Education in the UAEU distributed the questionnaires to Mathematics and Science teachers in 15 elementary schools in one of the largest towns in the emirate of Abu Dhabi, UAE. The researcher coordinated with the targeted schools' principals and teachers and scheduled a time for distributing and collecting the questionnaire during the teachers' professional development week. All the questionnaires (117) were distributed and collected from Mathematics and Science teachers on the same day as agreed. Before the teachers completed the questionnaires, they were informed

by the researcher about the purpose and nature of their participation in the study. They were also assured that their participation was voluntary and they could withdraw at any time or choose not to participate in any phase of the study. Additionally, the researcher made it very clear to the participants that all the data collected from them would only be used for the purpose of the study and their identities will not be released when reporting and discussing the results of the study. Teachers were also informed that they could contact the researcher at any time during the period of the study if they had any questions or they needed clarification about their participation in the study.

After collecting the quantitative data, the researcher planned to conduct focus-group interviews with fifteen male and female teachers from three different elementary schools. First, the researcher contacted the teachers in the targeted schools and agreed on a convenient time for holding the interviews with each group. Most of the teachers indicated that they preferred not to be video or audio recorded. Thus, it was planned that the researcher and the two assistant researchers would be present during all the interviews in order to be able to take extensive notes and to avoid missing any important points highlighted by the interviewees. Second, three extended focus group interviews were conducted for the purpose of collecting the qualitative data to support the quantitative data collected earlier via the questionnaire. Each group of the interviewees included five male and female teachers. All three focus group interviews took between 35 - 50 minutes. After reviewing all the information provided by the teachers during the interviews, the researcher decided not to conduct another interview as the provided information was found to be sufficient to support the discussion of quantitative results obtained from the questionnaire. All in all, the main reason for conducting only one interview with each group was that the teachers provided all the necessary and needed data to serve the purpose of the study.

Data Analysis

The data collected via the questionnaire were analyzed using descriptive statistics. Means, standard deviations, and rank were used to determine the most and least frequent answers for each item and/or theme. Independent sample -t test was used to compare the results between the two groups of teachers in relation to their years of experience. The reason for using this type of statistical analysis is that the independent sample t-test is more appropriate to compare two existing variables such as the participants' years of teaching experience. All the obtained results from the questionnaire were organized and inserted into three tables in accordance with the three research questions.

The qualitative data obtained via the focus group interviews were organized and checked by the researcher for consistency and accuracy. To ensure the inclusion of all the important data collected from the interviewees, the researcher revisited the raw data several times. Then, a framework was adapted to classify and/or categorize all the extracted data into several themes consistent with the quantitative instrument's themes and the study's research questions (Connelly & Peltzer, 2016). Then all themes were put into tables to make them more visible to be used at a later stage during the reporting and analysis of results. The organization of the data in this way, also helped in tracing the recurrent patterns and/or themes and establish their relationship with the quantitative data and/or results obtained from the questionnaire. Later, those recurrent patterns or themes can easily be used to support and strengthen the discussion of the quantitative results of the questionnaires (Creswell & Creswell, 20117).

RESULTS AND DISCUSSION

The data analyzed below answers the research question 1: "What are Mathematics and Science teachers' perceptions toward the use of English as the medium of instruction in their teaching?" Results indicated that teachers reported mixed views about using English as the medium of instruction for teaching Mathematics and Science (see Table 2). The mean scores of participants ranged from ($M=2.37$) to ($M=4.36$) on a 5-point scale, where (1) means the participant strongly disagrees and (5) means the participant strongly agrees with the statement.

Of all items addressing research question 1 in the questionnaire, the second item had the highest mean of ($M=4.36$) out of 5. Specifically, the second item asked participants' level of agreement with the following statement: "Students have difficulty reading course materials written in English." This major agreement among teachers was raised and discussed during some of the focus group sessions as participants believed that when students have limited vocabulary in English working with and comprehending word problems can be very challenging.

Furthermore, the second-highest mean was ($M=4.14$) which was teachers' level of agreement with the following statement: "Students' achievement in Mathematics and Science could be better if the subjects were to be taught in a native language." The previous results were echoed by interviewed teachers during the focus group interviews. These findings were similar to previous research results (Alhamami, 2015; Ahmad et al., 2013) which revealed that the majority of the teachers preferred to use the students' mother tongue. Additionally, the findings from the current study are in line with the results of Belhiah & Elhami, (2015) who found that only (27%) of teachers and (19%) of students prefer the use of English as a medium of instruction.

Regarding whether experience has any influence on teachers' perceptions, differences between teachers with less than 5 years and teachers with 5 or more years were investigated. T-test showed one significant difference in favor of teachers with less than 5 years. Specifically, teachers were asked to report their level of agreement with the following statement: "Only students with advanced English ability are interested in Mathematics and science." The mean score of teachers with less than 5 years was significantly higher than the mean score of teachers with 5 or more years of experience.

Table 2: Mathematics and Science teachers' perceptions toward teaching Mathematics and Science in English

		Overall Mean	SD	Means		T-Test	Sig (2tailed)
				1	2		
A1	Students' achievement in Mathematics and Science could be better if the subjects were to be taught in a native language.	4.14	.97	4.10	4.16	-.283	.778
A2	Students have difficulty reading course materials written in English.	4.36	.72	4.36	4.35	.103	.918
A3	Students have difficulty understanding Mathematics and Science in English.	3.88	1.01	3.80	3.91	-.502	.617
A4	Students are not motivated to do course assignments in English.	2.77	1.02	2.87	2.72	.636	.526
A5	Students are not motivated to ask questions during Mathematics and Science classes.	2.82	1.04	2.90	2.78	.684	.496
A6	Using English will motivate students to study harder and put more effort.	2.84	.94	2.93	2.81	.629	.530
A7	Using English will make children like school and education.	2.92	.91	2.87	2.93	-.347	.729
A8	Using English will make children like Mathematics and Science.	2.65	.89	2.53	2.69	-.805	.423
A9	Using English will make children understand Mathematics and Science.	2.53	.91	2.37	2.60	-1.175	.243
A10	Using English will make children be able to apply Mathematics and Science in their daily life activities.	3.09	1.05	3.20	3.05	.653	.515
A11	Using English will make children more confident to share with others their experiences in Mathematics and Science.	2.87	1.05	2.80	2.90	-.425	.672
A12	Using English will have a negative effect on students' first language competence.	2.37	1.12	2.70	2.23	1.961	.052
A13	I skip pages from textbooks due to the students' incapability to grasp the language.	3.75	1.14	3.5	3.84	-1.407	.162
A14	The longer time is needed for lesson preparation to come up with appropriate activities.	4.04	1.12	4.10	4.01	.361	.719
A15	Students think Mathematics and Science are difficult subjects because they are taught in English.	3.55	1.08	3.73	3.48	1.094	.277
A16	Only elementary school students with advanced English abilities are interested in Mathematics and Science.	2.81	1.27	3.23	2.65	2.178	.032

$P < .05$

1= less than 5 years' experience 2= 5 years or more experience

To answer question numbers 2 and 3: "What are the obstacles encountered by elementary teachers when using English as the medium of instruction for teaching Mathematics and science?" and "How, if at all, do experience and novice Mathematics and Science teachers differ in their teaching practices?" Results showed that teachers with less than five years and teachers with five years or more encountered similar obstacles that hamper their use of English as the medium of instruction for teaching Mathematics and Science. As shown in Table 3, the mean scores of participants ranged from ($M=2.86$) to ($M=3.89$). The obstacle that reported the highest mean by teachers was "students grasp the fundamental concepts in Mathematics and Science but cannot expand on them due to their limited English." In the focus group interviews, teachers made similar comments. According to one of the teachers from the focus group, "Some students have limited content specific vocabularies which may hinder students' conceptual understanding." This result is similar to findings reported by researchers about primary teachers' encountered challenges in teaching Science in Abu Dhabi public schools (Kadbey, Dickson & McMinn 2015). They stated that students' limited vocabulary is a huge obstacle in teaching and learning Science. This is in line with the findings of Ahmad et al. (2013), and Haryanto (2012), which reported that students prefer Malay and Bahasa Indonesia, respectively, rather than English as the medium of instruction due to their English language proficiency level.

The second highest result highlighted how difficult it was for teachers to communicate with parents regarding student work. Communicating with parents was regarded as an obstacle because the majority of Mathematics and Science teachers are expatriates, and hardly ever they speak Arabic, which is the language spoken by most parents. This is also supported by the teachers from the focus-group interviews as they stated that communication with parents was a barrier to being able to give them proper feedback about their children. Parents with limited English language skills avoided talking with Mathematics and Science teachers since they felt uncomfortable showing the teachers their limited ability in English. As a part of prestige, most people in the UAE are proud of their English language skills and feel that those who

do not speak English are not from the higher class. Consequently, people whose English language ability is insufficient to try to reduce the interaction with their children’s teachers.

Furthermore, during the focus group interview sessions, teachers asserted that due to students’ limited English, they find themselves teaching English instead of teaching Mathematics and Science. In addition, teachers believed students’ English incapability limited their classroom interactions and participation. Additionally, teachers stressed that because of the language barrier, students have difficulty sharing or expressing their thinking, which may lead to academic and social challenges. This finding is similar to results by [Kagwesage \(2012\)](#), who reported that students with limited language capability have difficulty understanding lectures and their participation is not effective.

Another notable finding which emerged from the discussions among teachers during the focus group sessions is their common agreement that they are indeed watered-down curricular content and over-simplifying some mathematical and Science concepts to make up for students’ limited language capabilities. This sentiment is shared by [Moore-Jones \(2015\)](#), who suggested that teaching academic content merely through a medium of a second language, teachers may face difficulty achieving the desired course outcomes. Additionally, this finding is in line with the results of [Briggs et al. \(2018\)](#), who reported that academic content might be affected when delivered through EMI.

Table 3: Obstacles of using English as the language of instruction to teach Mathematics and Science

		Overall Mean	SD	Means		T-Test	Sig (2tailed)
				1	2		
B1	The main barrier for me in teaching Mathematics and Science is language.	3.63	1.18	3.57	3.65	-.325	.746
B2	The language barrier in the elementary school puts students behind in Mathematics and Science.	3.55	1.02	3.73	3.48	1.152	.252
B3	Communicating with parents regarding student work is very difficult due to language barriers.	3.86	1.04	3.73	3.91	-.783	.435
B4	Students have difficulty demonstrating what they know in Mathematics and Science using English.	3.74	.99	3.83	3.70	.616	.540
B5	The provision of support is very limited due to language barriers.	3.63	1.06	3.70	3.60	.448	.655
B6	Students grasp the fundamentals concepts in Mathematics and Science but cannot expand on them due to their limited English.	3.89	.97	3.57	3.70	-.643	.522
B7	Students give up trying because of their limited English proficiency.	3.21	1.11	3.47	3.10	1.523	.131
B8	Students with low English ability prefer the specific format of examinations (selected-response questions such as true/false, multiple-choice or matching)	3.65	1.00	3.60	3.68	-.348	.728
B9	Due to students’ English incapability, the types of questions asked by students are the lower level of cognitive questions.	3.69	.99	3.70	3.69	.054	.957
B10	Students facing difficulty in clarifying mathematical and scientific concepts	3.78	.91	3.9	3.73	1.051	.296
B11	Teachers can’t go in-depth to extend student literacy in Mathematics and Science.	3.73	.99	3.73	3.73	.028	.978
B12	Teachers become less motivated to teach Mathematics and Science because students were passive learners.	2.86	1.10	3.10	2.77	1.413	.161
B13	Teachers spend considerable time teaching English instead of teaching Mathematics and Science.	3.19	1.17	3.27	3.16	.440	.661

$P < .05$

1= less than 5 years’ experience 2= 5 years or more experience

Question number 4 was: “What are the most instructional practices Mathematics and Science teachers prefer when using English as the medium of instruction?” As shown in Table 4, instructional practices teachers prefer to use relate to how in-depth English language is used throughout the practice. The overall mean scores ranged from ($M=2.07$) to ($M=4.56$) on a 5-point scale. The three highest mean scores in Table 4 are ($M=4.56$), ($M=4.34$), and ($M=4.22$) which are associated with modeling, drawing pictures, and using manipulations, respectively. As was mentioned earlier, this may be due to the fact that using pictures and modeling through the use of manipulations does not require a great deal of language exchange in which most work will be done by students themselves.

Interestingly, teachers with five years of experience or more had significantly higher mean scores on all of the previous three instructional practices (modeling, drawing pictures, and using manipulations). This may indicate that experienced

teachers exhibit a strong tendency to use more of modeling, drawing pictures, and using manipulations as instructional practices while less experienced teachers rely on presentations and lectures.

Table 4: Instructional methods in teaching Mathematics and Science

		Overall Mean	SD	Means		T-Test	Sig (2tailed)
				1	2		
C1	Modeling	4.56	.70	4.30	4.65	-2.40	.018*
C2	Using manipulatives.	4.22	.86	3.93	4.32	-2.15	.033*
C3	Draw pictures	4.34	.69	4.00	4.47	-3.31	.001*
C4	Solve simpler problems	3.81	.85	3.70	3.85	-.860	.392
C5	Acting	3.47	1.06	3.40	4.49	-.409	.683
C6	Presentations	3.70	.97	3.90	3.62	1.32	.188
C7	Interactive Activities	4.22	.78	4.10	4.26	-.954	.342
C8	Whole class discussions	4.05	.90	4.03	4.05	-.095	.924
C9	Exploration and/or discovery activities	3.73	.96	3.50	3.82	-1.55	.123
C10	Group assignments	3.70	.98	3.80	3.64	.716	.476
C11	Problem-solving activities	3.46	.90	3.40	3.48	-.412	.681
C12	Inquiry-based learning	3.38	.92	3.30	3.42	-.583	.561
C13	Concepts maps	3.03	1.07	2.97	3.05	-.369	.713
C14	Science fair	2.13	.95	2.50	1.98	2.551	.012*
C15	Mathematics fair	2.07	1.00	2.43	1.92	2.412	.018*
C16	Reflection	3.23	1.13	3.53	3.11	1.730	.087

$P < .05$

1 = less than 5-year experience

2 = 5 years and more experience

CONCLUSION AND RECOMMENDATIONS

The focus of this study was to examine teachers' perceptions about the use of English as the medium of instruction to teach Mathematics and Science in elementary schools in the UAE. An explanatory sequential mixed-methods design was used. The findings of this study demonstrate that teachers view English as a universal language and very essential for education and globalization. However, there are notable results that teachers confirmed that might need future policy considerations and future exploration. For example, teachers believed that they spend a considerable amount of class time teaching English instead of Mathematics and Science. An important result reported by teachers was that because students do not have high levels of proficiency in English, interactive and student-centered learning is very difficult to implement. The findings also suggest that teaching Mathematics and Science using English as a medium of instruction reduces students' engagement and participation.

As this study contributes to the growing body of literature assessing the use of English as a medium of instruction in the UAE, the topic needs to be further investigated with a larger sample of participants and more schools. Specifically, students' voices must be heard regarding their comprehension level and difficulties when taught in English. Another possible future study might try to explore how the use of English as a medium of instruction affects the extent of students' participation and engagement and how that can influence academic achievement. The study recommends that Mathematics and Science teachers make more effort to ensure that they are teaching Mathematics and Science, and not English. It is also recommended that more professional development activities should be offered to novice teachers at the beginning of their career journey. In addition, Mathematics and Science teachers, educational leaders, and curriculum designers should take into account the challenges that the students face during Mathematics and Science classes due to their low English language proficiency levels. Finally, English for Mathematics and Science purposes classes should be offered to the students with low proficiency levels at the early stages of schooling or at the beginning of each semester to enhance their English language skills.

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DECLARATION OF INTEREST STATEMENT

All of the data were collected from Mathematics and Science teachers working in various elementary schools in one of the largest towns in the emirate of Abu Dhabi, UAE. The collected data reflect the views of the participants, not the institution where they work. The participants' identities remained anonymous and used only for research purposes. Further, there is no funding or conflict of interest in this work.

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